



Variable-Speed Screw Chiller

What is this Technology?

In office buildings, chillers receive warm water from a building's internal systems, extract the heat, and return cold water in support of comfort cooling. Conventional chillers are most efficient at peak design loads, but, in reality, peak conditions rarely exist. This technology uses a variable-speed screw compressor, which is highly efficient at lower and partial cooling loads, where chillers spend approximately 98% of their time.

Why is GSA Interested?

Over the past five years, variable speed chillers have been developed for large-scale applications. This project will evaluate a smaller (200 ton), more modular approach, and determine whether the variable-speed screw chiller's ability to modulate capacity while maintaining efficiency results in year-round energy savings.



ENERGY EFFICIENCY Variable-speed screw chillers can achieve integrated partial load values (IPLV) as low as 0.299 kW/Ton, which exceeds the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) efficiency standards by as much as 44%.



COST-EFFECTIVENESS The manufacturer estimates that in many cases, paybacks can be as low as 3 years. Cost-effectiveness will vary depending on installation location, peak load requirements, and load variability. Locations facing high demand charges may benefit from the ability to better match operating load with actual demand.



OPERATIONS & MAINTENANCE The chiller's simple and direct design, coupled with a low number of component parts, limits the number of compressor tear-downs and inspections. It also reduces the expertise required of operators and facilities managers. In addition, this chiller compressor is surge-free, which increases operational flexibility.



DEPLOYMENT POTENTIAL This technology has broad deployment potential for both new construction and chiller retrofits due to its applicability in the vast majority of buildings with chilled water systems and its flexibility across climate zones.

The Green Proving Ground program has commissioned Oak Ridge National Laboratory to perform real-world measurement and verification of the variable-speed screw chiller in a pilot installation in a federally-owned building. Findings from the evaluation are anticipated to be available in 2016.



The Green Proving Ground program leverages GSA's real estate portfolio to evaluate innovative sustainable building technologies. The program aims to drive innovation in environmental performance in federal buildings and help lead market transformation through deployment of new technologies.